

Abstract

Internal PEM Fuel Cell Water Management

Water transfer means (86) transfers fuel cell product water from a cathode water transport plate (34) to an anode water transport plate (23) of the same or a different fuel cell, wholly within a fuel cell stack (50), (disposed within each fuel cell of a fuel cell stack (50)). The water transfer means may be a very high permeability proton exchange membrane (21a), a water transfer band (90) such as silicon carbide particles, a porous water transfer zone (107), with or without a flow restrictor (109), internal water manifolds (112, 113) which extend through an entire fuel cell stack, or internal manifolds (112a, 112b, 112c, 112d, 113a, 113b, 113c, 113d) which extend only through groups of cells between solid plates (71). As an example, 90% product water may be removed as vapor in oxidant exhaust, 30% may be transferred through the water transfer means (86) from cathode water transport plates to anode water transport plates, of which 20% may flow from the anode to the cathode, the net result of osmosis and proton drag, and 10% may exit the anode water transport plates as liquid water.